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The VCP News, page 410

News

Landsat Bill Passes in Congress

Commercialization of the land remote-sensing system is virtually guaranteed with the successful completion last week of an informal conference on the differences in the House of Representatives and Senate versions of the Land Remote Sensing Commercialization Act (H.R. 3153). Moreover, the House ratified the compromise version on June 28; the Senate was expected to ratify the bill before the July 4 recess. The bill will then be sent to President Ronald Reagan for his signature. Also on June 28, the Secretary of Commerce announced his selection for final contract negotiations of two of the seven bids received this spring for the operation of Landsat.

The House of Representatives passed H.R. 3153 on April 9. Nearly 2 months later, on June 8, the Senate passed an amended version of the bill, thus requiring the conference to sort out the differences.

Reagan is expected to sign the bill into law in March 1985. He called for the commercialization of both the land and weather satellite systems (*Eos*, March 22, 1984, p. 113). Commercialization of the meteorological satellite system was blocked last November (*Eos*, January 17, 1984, p. 17).

Among the key compromises agreed to during the informal conference involves the technology that would be employed with the commercial system. Charles Faust, a member of the staff of the Senate Commerce, Science, and Transportation Committee, told *Eos* the Senate had noted that the quality of data was important, but had not identified a specific technology. The House, on the other hand, had specified that the data must be collected using the Multispectral Scanner (MSS), which is aboard Landsat 3, launched this spring, and aboard the crippled Landsat 4. The compromise bill states that the technology used to gather the data must be compatible to MSS from the user's point of view, but that the scanner does not have to be the MSS, thus allowing for growth of the technology.

Also at issue was the provision for Congress to review the contract to the successful bidder or bidders. The compromise agreed to in the informal conference says that the Congress will have 30 calendar days to review the contract, rather than the 60 days in the House version of H.R. 3153 or 90 days that 30 continuous congressional days has specified in the Senate version of the bill.

Meanwhile, Secretary of Commerce Malcolm Baldrige announced last week that the Earth Observing Satellite Company (EOSAT) and a team headed by the Eastman Kodak Corp. would each enter into land contract negotiations with the Commerce Department this summer for the commercial operation of the land remote-sensing system. One will be selected in summer's end.

Both of the companies "are strong and offer significant likelihood of success in commercializing the system" from government to commercial operation, Baldrige said. "Both offer strong teams, good technical systems, good business approaches, and a continuation of U.S. technical leadership in land remote sensing."

EOSAT, based in Arlington, Va., is a joint

venture by RCA Corp. of New York, N.Y., the Hughes Santa Barbara (Calif.) Research Center, and the Computer Sciences Corp. of Silver Spring, Md. The team headed by Eastman Kodak, based in Rochester, N.Y., includes the Fairchild Space Co. of Germantown, Md., the TRW Electronic and Defense Sector of Redondo Beach, Calif., and the Environmental Research Institute of Ann Arbor, Mich.

Baldrige issued his decision on the evaluation by the Source Evaluation Board (SEB) for Civil Space Remote Sensing of the seven bids received (*Eos*, April 17, 1984, p. 149). SEB had reported its findings to Baldrige on May 20.

SEB did not make a specific recommendation on the bids, but did evaluate them on technical and economic merit, according to SEB Executive Secretary Larry Heacock. Among the criteria used were the merits of the commercialization plan, the management plan, and the bidders' understanding of the requirements detailed in the request for proposals about national security, foreign policy, accessibility to data, and data archival.

Key issues on the commercialization of the land remote-sensing system include concern over data commodity; foreign competition; nondiscriminatory access to data; national security; international policy; appropriate regulation of private remote-sensing activities; determination of the long-term federal role in remote-sensing research and development; and continuing, accessible, and consistent data archiving.—BPR

Proposals for Planetary Programs

Proposals submitted to the planetary geology and geochemistry program of the National Aeronautics and Space Administration (NASA) will be reviewed this fall. Scientists interested in being supported early in fiscal 1985 by the planetary and geochemistry program of the National Aeronautics and Space Administration (NASA) should submit their research proposals to the agency by late August. Although the program accepts unsolicited proposals at any time, it is anticipated that proposals received by NASA by late August will be reviewed this fall by a peer review panel.

The program supports scientific investigations that contribute to the understanding of the geological and geochemical evolution of the planets, their satellites, and smaller solar system bodies (asteroids and comets). Several types of research efforts underpin the program: generation of new, basic data; analysis and synthesis of existing data; and combination of both activities. The program fosters the gathering, synthesis, and comparative study of data that will improve the understanding of planetary geological and geochemical processes, their extent, and the results of their interactions through time; the origin and evolution of the solar system; the nature of earth in comparison to other planets; and the origins and distribution of life in the universe.

Both of the companies "are strong and offer significant likelihood of success in commercializing the system" from government to commercial operation, Baldrige said. "Both offer strong teams, good technical systems, good business approaches, and a continuation of U.S. technical leadership in land remote sensing."

Address questions regarding proposal form, evaluation procedures, and data availability to Joseph M. Boyce, Discipline Scientist at the above address; the price is \$3.50 for one copy of each issue number for those who do not have a deposit account; \$2 for those who do; additional copies of each issue number are \$1. Subscriptions to *SEAN Bulletin* are available from AGU Fulfillment at the above address; the price is \$18 for 12 monthly issues mailed to a U.S. address, \$28 if mailed elsewhere, and must be prepaid.

Geophysical Events

This is a summary of *SEAN Bulletin*, May 31, 1984, a publication of the Smithsonian Institution's Scientific Event Alert Network. The complete bulletin is available in the microfilm column of *Eos* as a microfiche supplement or as a paper reprint. For the microfiche, order document 184-106, a \$2.50 (U.S.) from AGU Fulfillment, 2000 Florida Avenue, N.W., Washington, D.C. 20009. For the paper reprint, order *SEAN Bulletin* (quoting volume and issue numbers and issue date) through AGU. Separately at the above address, the price is \$3.50 for one copy of each issue number for those who do not have a deposit account; \$2 for those who do; additional copies of each issue number are \$1. Subscriptions to *SEAN Bulletin* are available from AGU Fulfillment at the above address; the price is \$18 for 12 monthly issues mailed to a U.S. address, \$28 if mailed elsewhere, and must be prepaid.

Volcanic Events

Soputan (Indonesia): Tephra eruption. Rabaul (New Britain): Seismicity declines; two earthquake swarms, one crisis.

Manam (Bismarck Sea): Strombolian activity decreases at mid-month.

Langila (New Britain): Intermittent ash emission; three volcanic explosions.

Kliuchevskoi (Kamchatka): Strombolian activity builds cinder cone; lava flow.

Sheveluch (Kamchatka): Small ash ejection; no change to lava dome.

Etna (Italy): Continued lava production; Strombolian activity.

El Misti (Peru): Increased vapor emission. Sakurajima (Japan): Explosive activity continues at high level; debris flows.

Katla Seamount (Izu Is.): Discolored water; floating lapilli; formal name.

Kihuna (Hawaii): 19th and 20th phases; gas-piston activity.

Earthquakes

Date	Time, UT	Magnitude	Latitude	Longitude	Depth of Focus	Region
May 7	1700	5.8 M	41.77°N	15.89°E	10 km	S. central Italy
May 11	1042	5.5 M	41.03°N	13.93°E	10 km	S. central Italy
May 13	1246	4.9 mb	43.03°N	17.99°E	10 km	W. Yugoslavia
May 26	0359	6.7 M	37.73°S	10 km	200 km SW of Soputan	
May 30	0750	6.7 M	48.86°S	151.50°E	168 km	E. New Britain

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Mt. St. Helens (Washington): Explosions from dome; plumes and snow/water flows. Veniaminof (Alaska): Vapor plumes but no ash or incandescence. Atmospheric effects: Volcanic aerosols remain in stratosphere.

Soputan (Indonesia): All times are local (UT + 8 hours).

Soputan erupted from May 24 at 2213 until May 26 at 2300. An ash column rose to 3 km and moved W. Ash and sand-sized tephra fell on the area W of the volcano, forming a deposit more than 10 m thick over about 12 km². Although there were no people within the danger zone, about 3,000 were in the alert zone. About 350 spontaneously evacuated from the area, where the primary civilization is of coconut palms. Matrao and Gontalo airports (about 50 km NNE and about 200 km SW of Soputan) were closed May 26 and 27.

As of May 30, no volcanic earthquakes had been recorded, although two tectonic events were detected. No premonitory activity was observed. Soputan last erupted August–November 1982, ejecting large tephra clouds (see *SEAN Bulletin*, 1983).

Information Contact: Adjut Sudijat, Director, Volcanological Survey of Indonesia, Diponegoro 37, Bandung, Indonesia.

Kliuchevskoi (Russia): Kamchatka Peninsula, USSR (56°28'N, 161°58'E).

Continuous volcanic minor and night glow over the crater began in March. Lava flow and the number of explosive earthquakes increased from late March through May. During this period, the amplitude of volcanic tremor at 14 km distance and the maximum amplitude of explosive earthquakes increased 2 and 3 times respectively. Since mid-May, a lava dome has been visible in the central part of the crater. On May 22, as moderate Strombolian activity continued, lava began to pour into the NW valley.

A NE flank eruption began March 8, 1983, after about 1 week of seismicity, producing numerous lava flows. Weak explosions occurred from the summit crater (see *SEAN Bulletin*, 1983).

Information Contact: B. V. Ivanov, Institute of Volcanology, Prof. Asst. Dr. Petropavlov, Kavachchikha 63700 USSR.

Sheveluch (Russia): Kamchatka Peninsula, USSR (56°28'N, 161°58'E). All times are local (UT + 8 hours).

A single ash ejection to 1 km height occurred May 22 at 2356. No changes to the lava dome were observed. Lava extrusion and explosive activity at Sheveluch began in late August 1980.

Information Contact: Same as for Kliuchevskoi.

Etna (Italy): Sicily (17.5°N, 15.2°E).

The following is a report from Romulo Roman.

"The SE Crater eruption that began April 27 see last month's *SEAN Bulletin* was continuing in early June. The explosive Strombolian activity from the small new cone within the SE crater had been diminishing and stopped almost completely May 13. Starting on the May 13, ash ejections have been observed at more or less regular intervals, while slow emission of gas and vapor usually occurred. The Strombolian activity started again in late May; at times (May 25 and June 4) it was particularly virulent.

"The effusive activity has been continuous, with alternating phases of greater or lesser vigor. The lava field has grown noticeably toward the south (reaching a maximum dimension of more than 500 m) and as of early June had in its interior many ephemeral effusive vents which generated small lava flows that advanced over earlier ones. The main lava flows (generally one to the south and another to the north), which originate from the convergence of the small flows, barely got below 2700 m elevation.

"At irregular intervals, more or less violent ejections of reddish ash from the larger vent of the central crater have been noted, while from the W vent (Ovaca Nuevo) there have only been emissions of gas and vapor."

Information Contact: Romulo Roman, Istituto Internazionale di Vulcanologia, Via Regio Margherita 6, 95129 Catania, Italy.

Kaita Seamount, Izu Islands, Japan (26.2°N, 141.10°E).

Observations of a submarine volcano in the Izu Islands by the Japan Maritime Safety Agency (JMSA) beginning March 7 (see *SEAN Bulletin*, 9(2)), indicated that eruptive activity was at its highest level and to late

June 26, 1984 EOS

Planetary Geology and Geophysics Program, Solar System Exploration Division, Code EL, NASA Headquarters, Washington, DC 20546 (telephone: 202-355-1507).

Atmospheric effects: Volcanic aerosols remain in stratosphere.

Soputan (Indonesia): All times are local (UT + 8 hours).

Soputan erupted from May 24 at 2213 until May 26 at 2300. An ash column rose to 3 km and moved W. Ash and sand-sized tephra fell on the area W of the volcano, forming a deposit more than 10 m thick over about 12 km².

Although there were no people within the danger zone, about 3,000 were in the alert zone. About 350 spontaneously evacuated from the area, where the primary civilization is of coconut palms. Matrao and Gontalo airports (about 50 km NNE and about 200 km SW of Soputan) were closed May 26 and 27.

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Information Contact: Adjut Sudijat, Director, Volcanological Survey of Indonesia, Diponegoro 37, Bandung, Indonesia.

Kliuchevskoi (Russia): Kamchatka Peninsula, USSR (56°28'N, 161°58'E).

The Oceanography Report



U.S. GOVERNMENT PROPERTY TO SCIENCE

Editor: Arnold L. Gordon, Lamont-Doherty Geological Observatory, Palisades, NY 10561 telephone: 914-299-0100, ext. 325.

Editor Designate: David A. Bouc, Department of Oceanography, Texas A&M University, College Station, TX 77843 telephone: 936-847-5327.

Wayne V. Burt: AGU Ocean Sciences Award

The Ocean Sciences Section of AGU recognizes Wayne V. Burt's 30 years of participation, leadership, and service in the oceanographic community. He earned his B.S. degree in Mathematics at Pacific College in 1938, and after serving in the U.S. Naval Weather Service (including study at the Naval Postgraduate School while it was still in Indianapolis), he obtained his M.S. and Ph.D. degrees from the UCLA-Scripps Institution of Oceanography program in 1948 and 1952, respectively.

After serving on the faculty at the Cheyenne Bay Institute of The Johns Hopkins University, and on the research staff of the Department of Oceanography at the University of Washington, Wayne returned in 1954 to Oregon, where he had been raised, determined that the state needed a program in oceanography, regardless of whether or not it recognized this fact. The University of Oregon displayed little interest in his vision, but President Strand of Oregon State University (OSU) provided him with a niche; that is, a corner, where he could pursue his Office of Naval Research (ONR) sponsored research. This base allowed him to develop a proposal that led to funding under ONR's TENC program (which supported the development of most of the "second generation" oceanographic institutions in the United States, and to formation of a Department of Oceanography in 1959).

By the time Wayne stepped down as chairman of the department in 1987, its budget had grown by a factor of 200 than a decade, it supported a faculty of 30, with strong research programs in all fields of oceanography, and was graduating about 30 MS and Ph.D. oceanographers each year. Of course, there were buildings to be built, and research vessels to be acquired, too. This rapid development was achieved through quiet diligence and persistence and an exceptional personal stewardship, which inspired the confidence of funding agencies. During

NOMINATIONS FOR AGU FELLOWS AND AWARDS

September 15 is the deadline for nominations from the membership for AGU Fellows. Special nomination forms are available for your use in nominating a friend or colleague as a fellow.

November 1 is the deadline for nominations for awards for 1985. Nominations are being accepted for the William Bowie, Walter E. Smith, John Adam Fleming, Walter H. Bucher and Maurice Ewing Medals and the James B. MacLavane Award. Letters of nomination outlining significant contributions and curriculum vitae may be sent directly to AGU for forwarding to the appropriate selection committee.

For Fellow nomination forms, information on criteria for the awards, or a list of past recipients call or write:

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outside the Washington D.C. area)

this period of growth at OSU, Wayne served as President of the former Oceanography Section of the AGU and President of the Pacific Section of AGU. He has also served on the Council and the Executive Committee of American Meteorological Society (AMS) and is a Fellow of the AMS.

Since 1967, Wayne has not rested on his laurels. He has continued an active research program in air-sea interactions, which has led to numerous additional publications. Wayne has also served as associate dean of research at OSU, and he has spent 2 years at ONR's Lamont branch, where he produced a stream of reports on European research laboratories that has served as a later-day oceanographer's Michelangelo. Wayne has always been a strong advocate of oceanographers going to sea and has taken part in Canadian, German, Japanese, and three British expeditions as well as numerous cruises on American research vessels. This level of research activity is unprecedented for former, long-term academic administrators.

Wayne formally retired at the end of 1981. He still maintains a research program, travels widely, and participates actively in the College of Oceanography; however, in fact, using the logs of Spanish galleons that are still on record in Madrid, he has a novel research project which is investigating Pacific climate variability of a few centuries ago.

Wayne's contributions to oceanography in Oregon have been recognized through an Honorary Doctorate of Science from George Fox College, Distinguished Professor and Centennial Awards from OSU, and a Governor's Scientist Award. It is fitting that his role in developing an academic oceanography in the United States should finally receive national recognition.

This item was contributed by Christopher N. R. Mooers, President, Ocean Sciences Section; Joseph L. Reid, President-Elect; and Peter G. Brewer, Secretary.

News & Announcements

New TOR Editor

David A. Brooks, associate professor at Texas A&M University's oceanography department, has been appointed editor designate of The Oceanography Report (TOR). He succeeds Arnold L. Gordon of the Lamont-Doherty Geological Observatory.

Gordon, who initiated TOR in September 1981, is the new president-elect of the AGU Ocean Sciences Section.

Brooks, a physical oceanographer, has been at Texas A&M for 11 years. His research interests include waves and tides, the interaction of waves and currents, Gulf Stream fluctuations, and Gulf of Mexico and Gulf of Maine circulation. Before going to Texas A&M, Brooks was a research associate and graduate faculty member at North Carolina State University in Raleigh.

Manuscripts for TOR should be sent to Brooks, Department of Oceanography, Texas A&M University, College Station, TX 77843. Brooks hopes to stimulate a broad base of TOR submissions in the future (see his comments, this issue). For speediest treatment of contributions, send three copies of your double-spaced manuscript to Brooks and one copy to AGU headquarters.—HTR

Glaciers and Why They Surge

Researchers studying southern Alaska's Variegated Glacier believe they have found an explanation for why the 24-km-long ice mass, like other "surging" glaciers, periodically speeds up in its movement down valley. The surges, they propose, have to do with increases in water pressure beneath the glacier—the result of inhibited drainage at the base of the ice—that cause it to become more slippery and to flow faster.

The Variegated Glacier, located northwest of Juneau near the village of Kukukuk, is small among surging glaciers, but it has been one of the most extensively studied in this century. Every 18–20 years, it begins to accelerate its flow rate. The last time such a surge began was in January 1982. The glacier reached a peak velocity of 9 m per day by summertime, then returned to near normal flow rates of 1–2 m per day by early fall. It started up again in November 1982, however, and by the next spring was speeding along at 54 m per day. Then, in early July 1983, the surge stopped abruptly when large amounts of water drained out of the glacier.

The new findings were reported to the National Science Foundation by Charles E. Ray

and the University of Washington, William D. Harrison of the University of Alaska, and Barclay Kamb of the California Institute of Technology. Their conclusions were based on more than 10 years of observing the Variegated Glacier. By placing cameras along the adjacent valley wall, the team was able to document the glacier's motion with time-lapse photography. The glacier was also photographed from the air periodically to monitor its motion. Measurements of water flow and pressure were taken by drilling holes in the ice.

The research team attributes the buildup in water pressure at the base to changes in the shape and motion of the glacier that prevent drainage of meltwater. Although the Variegated Glacier is remote enough that floods associated with the surge do not threaten inhabited areas, other glaciers in northern areas could cause property damage or endanger lives, according to the scientists.

Indian Ocean Proposed Drilling

Tentative plans for the Ocean Drilling Project (ODP) are for the drilling vessel *Sediment* (NP 47) (Eos, March 13, 1984, p. 97) to work in the Indian Ocean during all or part of 1987 and 1988. The Indian Ocean Advisory Panel (IOP) solicits letters of intent or proposals for possible scientific ocean drilling during that period. All areas within the Indian Ocean and any important problems, including tectonics, nature of the lithosphere, paleoceanography, and sedimentary processes will be considered.

Please send proposals, with appropriate charts and copies of pertinent data, in triplicate to the Office of Joint Oceanographic Institutions Deep Earth Sampling (JODI) Office, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149 and, if possible, also send one copy to the chairman or to any other members of the panel. Proposals and letters received before September 1 will be reviewed at the panel meeting scheduled for the first week of September. Indian Ocean panel members are J. R. Curran (Chairman), Scripps Institution of Oceanography, La Jolla, CA 92093; J. R. Gorham, Lamont-Doherty Geological Observatory, Palisades, NY 10561; F. Graciano, BFO geological survey of Canada, Dartmouth, NS B2Y 4A2, Canada; R. Herfurth, University of Bern, CH-3000 Bern, Switzerland; W. L. Prell, Brown University, Providence, RI 02912; R. Schlich, Université Louis Pasteur, 67004 Strasbourg Cedex, France; U. von Rad, Bundesanstalt für Geowissenschaften und Rohstoffe, D-7010 Hanover 51, Postfach 310153, West Germany; R. White, Cambridge University, Cambridge, England.

This item was contributed by Joseph R. Curran, Chairman of the Indian Ocean Advisory Panel.

Warm Core Rings

Gulf Stream phenomena have been the focus of numerous studies by U.S. and Canadian oceanographic laboratories. Two years ago, observations of warm core rings associated with the Gulf Stream were reported in *The Oceanography Report*, (November 2, 1982, p. 84). It was noted then that the structure of warm core rings can undergo rapid transformation. Recently, multidisciplinary groups of physical and biological oceanographic institutions have examined the evolution of warm core rings in detail (*Nature*, 308, pp. 87–88, 1984). The study has involved research vessels *Eduardo*, *Albatross II*, and *Altair*. In surface measurements of temperature, salinity, and for measurement surface pigments to

assess the concentration of marine plants. The results are that even though warm core rings are often very stable, undergoing only slow changes, it turns out that major alterations in structure can and do occur in short periods of 2–5 days.

Warm core rings are volumes of Sargasso Sea water that are bounded by the separation of north-extending meanders of the Gulf Stream that have broken away from the main continuous volume gradient. Warm core rings have diameters that can be as large as several hundred kilometers. They are always characterized by having a clockwise rotating rim, which is a vestige of the Gulf Stream itself. Thus, these rings are rotating blocks of Sargasso Sea mass that move in continental slope water between the Gulf Stream and the Continental Shelf.

The causes for rapid structural changes are due to interaction with other Gulf Stream meanders. The Gulf Stream absorbs the core and much of its energy in such an interaction, flaring this type of interaction, warm-core rings will change rapidly.

This study involved observations of warm-core ring 81-1 in the initial September-October 1981. Ring 81-1 was observed by surface ship measurement and by satellite observation; the results on the ring's surface temperature field correlated well. After interaction with the Gulf Stream meander, however, the shipboard measurements were insufficient to describe the changed properties of the ring compared with the satellite images.

Additional observations of the study included those of warm core ring 82-B, April-August 1982. Again, it was observed that ring evolution was strongly influenced by episodic interactions with the Gulf Stream.—PMB

This item was contributed by Christopher N. R. Mooers, President, Ocean Sciences Section; Joseph L. Reid, President-Elect; and Peter G. Brewer, Secretary.

Editor's Notes

Since its debut in the September 1, 1981, issue of *Eos*, *The Oceanography Report* (TOR) has provided timely dissemination of information of general interest to the oceanographic community. Under Arnold Gordon's able editorship, 32 installments of TOR have been published with monthly regularity. A quick survey shows that 11 issues have dealt mainly with physical oceanography; nine with ocean policy or agency matters; three each with biological, chemical, and geological oceanography; and three issues were mainly concerned with new instrumental techniques. While it is not always practical or desirable to classify TOR this way, there has clearly been a disparity among articles related to the various sub-fields of oceanography. This reflects the nature of articles submitted and not TOR's editorial policy, which is to provide as much for general and timely information of potential interest to all oceanographers. We continue to invite contributions to TOR in any of its five principal parts.

1. Article: A substantive essay on a topic of general current or historical interest, including overviews of multidisciplinary or multidimensional scientific projects and programs.

2. Information Report: A shorter description of support services and new technologies available to oceanographers.

3. News and Announcements: Brief items of interest to oceanographers, such as agency reports, national political matters affecting ocean policy, new appointments, and other ocean policy, new appointments, and other ocean policy news.

4. Letter of Opinion: Signed responses to articles or other items published in TOR or to other items published in TOR.

5. Meetings: Schedules and agenda of coming meetings and reports of meetings held recently.

—David A. Brooks, *Editor*

News (cont. from p. 425)

TABLE I. JMSA Observations at Knikotu Seamount

Date	Observation
March 7	9 x 15 km of discolored water
March 8	floating lapilli; 0.5–3 x 50 km of discolored water
March 9	sea water temperature at vent 1°C higher than floating lapilli; 9 x 30 km of discolored water
March 12	floating lapilli
March 13	sea water near vent 1–2°C higher; floating lapilli; vapor plume
March 15	floating lapilli; vapor plume
March 16–19	floating lapilli; vapor plume
March 22	dark plume; luminescence at night
March 23	vapor plume; luminescence
March 24, 25	floating lapilli
March 28	floating lapilli
April 9	0.8 x 8 km of discolored water
May 8, 10	area of discolored water 0.3 km in diameter

March, when floating ejecta and vapor plumes were nearly always seen. Beginning in April, activity subsided gradually. The area of discolored water decreased from 15 x 30 km in early March to 300 m in diameter in early May (see Table 1).

On either side of the submarine vent (coordinates are in line, above) are two shallow depressions. The E one is at 62°39'N, 140°42'E, the W one, 62°43'N, 140°47'E. The JMSA has formally named the feature Knikotu Kaizan (Kaitoku Seamount).

The acoustic (T-phase) waves from strong submarine activity at this location were recorded by Réseau Sismique Polynésien situated between March 26 and April 30 (see last month's *SEAN Bulletin*).

Information Contact: Office of Volcanic Observation, Seismological Division, Japan Meteorological Agency, 1-3-4 Otemachi, Chiyoda-ku, Tokyo 100, Japan.

The new findings were reported to the National Science Foundation by Charles E. Ray

of the University of Washington.

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1984 William Bowie Medal to Marcel Nicolet

Citation

Professor Marcel Nicolet has been awarded the William Bowie Medal for 1984 because of his contribution to the elucidation of the chemistry of the earth's upper atmosphere and for acting as Secretary General of the Special Committee of the International Geophysical Year (1953-1960). Marcel Nicolet has made a greater contribution to our understanding of the chemistry of the earth's upper atmosphere than any other single individual alive or dead. Some of his contributions are (1) determination of photoionization and photodissociation coefficients; (2) showed the importance of diffusion in determining concentration profiles in the thermosphere; (3) elucidated the mechanism for the infrared airglow formation; (4) predicted the presence of the D layer; (5) explained the formation of the D region as due to NO ionizing by Lyman-alpha radiation and cosmic rays; (6) predicted the presence of NO, NH₃, HNO₃, H₂O, and H₂O₂ in the upper atmosphere before they were measured; (7) was the first to recognize the importance of NO, HNO₃, NO₂, and HCO₃ (HO₃) in the upper atmosphere; (8) was the first to conclude that N₂O by its reaction with OH is important in the stratosphere as a source of NO.

Perhaps the most remarkable thing about Nicolet is that he undertook the study of aeronomy to assist himself during the Second World War, when the German occupation army would not let him practice his profession at the time, which was meteorology. Other aspects of his career have been pointed out by some of his colleagues. Professor David Bates wrote the following:

"I think some considerable stress must be put on his work (1953-1960) as Secretary General of the International Geophysical Year. Without his devotion and skills, his knowledge, and his sense of responsibility toward science, toward fellow scientists, and toward participating countries and organizations the IGY could not have been the outstanding success it was."

"Marcel Nicolet owes his every great achievement as a scientist partly to a remarkably retentive memory in which he has systematically stored a wide knowledge of aeronautics and related sciences; partly to being sensitive to early signs of conflicting evidence in an extremely complex subject. This combination enables him to focus his acute scientific insight on a problem at the rewarding early stage. Moreover, he has the tenacity to return and pursue a problem if later developments show it is more tangled than originally supposed, as so often happens in aeronomy."

Dr. Alan Grobeker wrote:

"The extent to which Professor Nicolet's work has led the field of the chemistry of the upper atmosphere is truly remarkable. Furthermore, in all his voluminous work, I cannot recall a single instance where his theory has failed to come extremely close to subsequent observations."

Because of his work, Dr. Nicolet has received the following scientific distinctions:

1. 1st Prize (1957). The University Examination of Belgium 1935-1937 for the group of the physical sciences.

2. Triannual prize of the foundation Agathon de Potter (1940-1942) of the Belgian Royal Academy of Sciences for the investigations in Solar Astrophysics.

3. Adel and Florence Guggenheim prize of the International Academy of Astronautics for the discoveries in the field of Astronomics in the last 5 years (1963).

4. Hodgkin Medal Citation of the Smithsonian Institution (1965) for achievements in Aeronomy.

5. Member of the Royal Academy of Sciences and Arts of Belgium.

6. Foreign Associate of the U.S. Academy of Sciences.

7. Foreign Associate of the French Academy.

8. Honorary member of the Royal Irish Academy.

9. Doctor honoris causa, Queen's University of Belfast.

10. Fellow of the Royal Astronomical Society.

11. Past Member and Chairman of the Science Group of the International Academy of Astronomics.

12. Corresponding Member of the Royal Society of Sciences of Liège.

13. Fellow of the American Geophysical Union.

14. Member of Chapter-at-large of Sigma Xi.

An objective indication of the scientific work of Marcel Nicolet is provided by the list of his publications indicating the wide range of reactions of molecules and atoms that have been understood as a result of his research.

In his first publication in aerophysics

in 1934 (1938) for which he received the Belgian Academy Award in 1940, and also became a Foreign member of the Royal Astronomical Society, M. Nicolet examined quantitatively and determined the molecular composition of the sun. He carried out a detailed analysis of the country molecular composition and was the first to show in 1938 that the rotational structure of the CH molecules was needed in understanding the composition of comets. During the same period (1937-1940), Nicolet pioneered the study of atmospheric chemistry by investigating the physical and chemical processes involved in the atmospheric airglow and aurora. He made the first correct analysis of the identification of spectral lines in the aurora and airglow, and he correctly concluded (with Bates) that the luminous layers of the atmosphere could not be at such great altitudes as was claimed by observers. His survey published in 1939 on the problem of atomic species in the upper atmosphere provided the fullest account available of the atmospheric structure resulting from chemical dissociation processes.

After World War II (1945-1950), M. Nicolet became an authority in atmospheric ion chemistry after the publication of his famous work on the constitution of the ionosphere. A work on the constitution of the ionosphere, a set of papers was published that formed the basis for many subsequent studies of the ion-chemistry of the upper atmosphere of the earth. His proposal in 1945 of the existence of nitric oxide in the upper layers of the atmosphere was an important theoretical discovery of a minor constituent which plays a leading role in the ion-chemistry of the terrestrial atmosphere and also in the neutral chemistry of the stratosphere. This early discovery of nitric oxide was invaluable in connection with the development of atmospheric chemistry. Nicolet's work in atmospheric chemistry led him (with Bates, 1950) to carry through pioneering studies on the photochemistry of hydrogen-oxygen, as distinct from a pure oxygen atmosphere, and resulting from the specific actions of OH and HO₂ radicals are still, after 30 years, an essential element for the explanation of stratospheric and mesospheric chemistry. In addition, the explanation of the infrared emission in the atmospheric night glow by the reaction

of atomic hydrogen with ozone leading to excited OH radicals was also a result of these pioneering studies.

Nicolet carried out the first quantitative investigation on atmospheric diffusion in photochemical and chemical equilibrium systems. He explained the upward transport of a heavy molecule, namely, molecular oxygen and the downward transport of atomic oxygen before its recombination at low altitudes. He predicted an abnormally large concentration of O₂ molecules toward high altitudes which was later confirmed in detail by in situ measurements using rockets. The work he and his associates did on the dissociation of various atmospheric molecules and the transport of their products was of the utmost importance in connection with the constitution of the terrestrial atmosphere at various altitudes.

I must recall especially that, in 1950, it was my good fortune to have been invited by Franklin Roach to come to Pasadena to work with David Bates on the airglow emissions and to have been there for 6 months with Sydney and Katherine Chapman. In Pasadena, I had the extraordinary opportunity of being able to talk to Millikan, Epstein, Gutemberg, Bowen, Minot, and many others at Caltech and at the Mount Wilson Observatory, and also to have discussions often with Joe Kaplan and Jack Bjorkes at UCLA.

From Sydney Chapman and David Bates I learned how to make use of certain ingredients essential to scientific research, and in particular how to remain patient for more than a few minutes each day. In addition, Katherine Chapman taught me how to avoid being much of a skeptic.

It was at Pasadena, too, that, after long discussions with David Bates and myself, Sydney Chapman proposed the new nomenclature for the various layers of the atmosphere, which was designed to cover heights from the troposphere up to the exosphere, and which has since become classical and has been adopted for everyday use. Since I had expressed the reasonable opinion that the upper limit of the stratosphere should be 50 km, the temperature maximum corresponding to the stratosphere, it became necessary to find a term suitable for application to the region between the stratosphere and the thermosphere. It was at this point that Katherine and Marcel recalled that they had both studied Greek at school and that the word *mesos* (middle) was involved in ion production. This work was selected as the most cited paper by the citations index for ionospheric research in the terrestrial atmosphere.

During the last 10 years, Nicolet has made important contributions to atmospheric chemistry by drawing attention to the various aspects of the interactions between the photo-dissociative action of solar radiation and the nature of chemical reactions. Particularly important was his work clarifying the problem of nitrogen oxides and hydrogen compounds in the oxygen atmosphere. He discovered in 1970 that the atmospheric production of NO is not caused by the photoionization of nitrous oxide into nitric oxide and atomic nitrogen but by the reaction of the excited oxygen atom (responsible for ozone photoionization) with nitrous oxide. During the course of his work he has developed and applied general methods by which he can determine the photo-dissociation parameters to be used in the quantitative analysis of the atmospheric chemistry.

A general survey (1980) of 530 pages entitled "Étude des réactions chimiques de l'atmosphère dans la stratosphère," starts with the full historical account available on the growth of our knowledge on atmospheric chemical reactions, then contains a quantitative analysis of the various chemical reactions in the stratosphere and mesosphere and provides the full set of general equations that will be used in the future for the numerical study of the stratospheric and mesospheric chemistry.

Julian Heicklen

Acceptance

A few weeks ago, a telegram was delivered by hand to my home in Brussels. When I opened it, I was with genuine emotion that I read the message and also the congratulations addressed to me by our President, James Van Allen. For me, the award of the William Bowie Medal could only be regarded as a present arising out of the generosity of my friends. As I read the text of the telegram, my thoughts were carried 35 years backward in time to my first journey to the United States in January 1950. One of my lasting memories of that occasion was my first visit to Washington, D.C., and to Cambridge, Mass., and the kindness shown to me by Lloyd Berkner, Merle Tove, and Harry Vesite at the Department of Terrestrial Magnetism, by Edward Hilliard and Richard Tousey at the Naval Research Laboratory, by Grote Reber at the National Bureau of Standards, by Harlow Shapley, Donald Menzel, and Fred Whipple at the Harvard Observatory, . . .

But between May 1980 and November 1981, other events were taking place. First of all, in June 1980, I was invited to Columbus, Ohio (Cincinnati was to come later) to attend the annual Conference on Spectroscopy and to present some unpublished results on the photochemistry of water vapor which I had obtained with David Bates. It was a question of explaining the mechanism responsible for the prominent features of the night airglow spectrum in the infrared, which are due to the rotation-vibration spectrum of the OH molecule. The unknown origin of these excited molecules had just been discovered by David Bates and Marcel Nicolet (more by David

than by Marcell); they resulted from a process, taking place in the mesosphere, in which two minor atmospheric constituents, atomic hydrogen and ozone, reacted together to produce an OH radical excited up to the actually observed vibrational level.

Just afterward, on leaving California, David Bates, Sydney Chapman, and Marcel Nicolet received an invitation from Art Waynick who, in 1949, was the founder and the first Director of the Ionosphere Research Laboratory at State College, Pennsylvania State University. We were to attend an International Conference on Ionospheric Physics in the last week of July 1950, at which about 250 participants were expected. Most of the papers were to be presented by visitors from other countries: D. R. Bates, H. G. Booker, S. Chapman, W. Dieninger, L. H. Harang, L. G. H. Huxley, D. F. Martin, P. M. Milinow, S. K. Mitra, M. Nicolet, J. Sayre, K. Weeks, and R. de V. R. Windfuhr. It was here that my second "intoxication" began: my wife and I were overwhelmed by the particularly friendly welcome from Art Waynick, whose idealism and disinterested attitude to research were very striking. It was following this meeting that Art Waynick invited me to become a permanent "Penitente Ionosphere Lab. Resident," and I was honored when his successor, John Nishida, renewed the invitation. More than 30 years of collaboration with the Ionosphere Research Laboratory can not be summarized in a few words, nor can they be forgotten. I would like to say simply that, notwithstanding the various surprises of crossing the Atlantic, these have been years of fruitful scientific research, thanks to the collaboration of my graduate students, also research associates. I shall mention only the first of these, *an ab initio*: Phil Mange, who was and still remains a true scientist, and who is nevertheless willing, perhaps too often, to devote much of his time to the development of the science of others.

After returning to Belgium, full of enthusiasm following my travels and meetings, I was confronted in Brussels by the limitations of a small country. The plan that I had in mind for the future was far from receiving general approval, in spite of the support given by a few highly placed personalities. In fact, my various proposals were admittedly not yet成熟. It was in this way that the intermediate region between the stratosphere limited at 50 km and the thermosphere received the appellation "mesosphere." It was while I was still in California in May 1950, in the context of my research work at Pasadena, that I received an invitation to participate in a meeting of a few days in a "satellite camp" in the desert at Irkutsk, near Ulan-Ude, C.I.S.R. The aim of this meeting was to discuss the problems of the upper atmosphere in the light of the then dawning space age. The Naval Research Laboratory had already modified various laboratory instruments for use in V-2 rockets, in order to make high-altitude measurements of atmospheric pressure, solar UV and X radiation, atomic and molecular absorption, and various ionospheric parameters. Those present at this meeting were J. A. Van Allen, W. N. Arnett, E. V. Ashburn, D. R. Bates, L. V. Berkner, S. Chapman, C. T. Elvey, J. L. Greenstein, B. Gutemberg, J. Kaplan, A. B. Meinel, M. H. Nichols, M. Nicolet, M. O'Day, R. Penndorf, F. L. Riachi, F. Rogers, M. A. Tove, G. I. Weisheit, and O. Wulf. It was at this meeting that I had the opportunity of meeting Jim, our President, for the first time. This was long before the appearance in 1958 of the well-known photograph of the triumphant team associated with Explorer 1: von Braun, Pickering, and Van Allen; it was at April 1950, only a month earlier; it was at Jim's home in Silver Spring, Md., that the idea of the "future" International Geophysical Year (IGY) was launched.

In the course of various discussions with Lloyd Berkner and Sydney Chapman at Irkutsk, I became "intoxicated" about the concept of the IGY. On the other hand, it was not until a year later, in November 1951, that I had my first introduction to the world of scientific research. This was during a symposium in San Antonio, Tex., on the "Physics and Medicine of the Upper Atmosphere," the proceedings of which were published by the University of New Mexico Press in 1952. Just after I had spoken on "Solar Physics and the Atmosphere of the Earth," James Van Allen explained in a personal conversation that there was general agreement that a coordinated approach to problems was necessary after 6 years of closed frontiers. In the summer of 1946, the International Union of Radio Science (URSI) held its General Assembly in Paris, and there I met Edward Appleton and others. In 1947, the Gas-Work Committee of the Royal Society organized an international meeting in London on airglow and the aurora. Scientists who had worked in this field were invited to participate, and it was there that I met David Bates for the first time. About the same time, the Centre National de la Recherche Scientifique de France invited research workers to attend a conference in Lyon to discuss the relations between solar and terrestrial phenomena. In July 1948 the Scientific Unions convened a meeting of the Mixed Commission on the Ionosphere in Brussels in order to review the results of the past 6 years. For the first time in 10 years, the International Astronomical Union met in August 1948 in Zurich, Switzerland, just a week after the Assembly of the International Union of Geodesy and Geophysics (IUGG) in Oslo, Norway.

The series of International occasions, and especially the IUGG Assembly, enabled me to meet the leading scientists of the time, and to take part in discussions on many different topics. On the other hand, I had become convinced that numerous meetings and isolated discussions could not alone lead to a clear understanding of geophysical phenomena, in particular, of those relating to the upper atmosphere. Solar physics had its own objectives, but the knowledge to be acquired must be applied also to the study of geophysical phenomena. Routine meteorological observations were very essential, but meteorology must become part of the broader field of atmospheric research. The physics of the earth's interior was concerned with specialized investigations, but these needed to be linked to studies of the upper atmosphere.

On August 26, 1948, in Oslo, Sydney Chapman was chairman of an animated discussion in which I participated in the role of "head of the rebels" to quote Chapman himself; others present were Arlette Vasy, Jean Godolin, Edward Hollard, Joe Kaplan, Frantisek Link, David Martin, Merle Tove, and Fred Whipple; all of us under the friendly regard of Carl Störmer and Leif Vergeard. The aim was to consider setting up a permanent organization within the Union for the study of upper atmospheric phenomena. What had started off the discussion was the fact that Edward Hollard was to give a talk on "The Brightness and Polarization of the Daylight Sky" to the Association of Terrestrial Magnetism and Electricity, while, at the same time, Fred Whipple was talking about "Metene" elsewhere in the Association of Meteorology. This discussion was the detonator that led in the end to the creation of the Association of Geodynamics and Aeronomy at the IUGG Assembly in Rome in 1954.

The events described earlier provide the background to my arrival in the United States in 1950. Although I could not forget either my interest in astrophysics and the sun, or my responsibilities as a meteorologist, nevertheless my "intoxication" with the concept of the need for synthesis affected me similarly toward the astronomy of the future. But although a European by upbringing, I was about to become intoxicated by American Friendship.

Later, before my return to Europe, I was

AGU (cont. from p. 329)

to be intoxicated for the third time, at Invikern by Lloyd Berkner and Sydney Chapman (see above). The formal proposal for a third Polar Year was presented at a meeting of the Mixed Commission on the Ionosphere, at the Palace of the Academies in Brussels, held from September 4–6, 1950. The chairman of the Commission was Edward Appleton, who was also president of URSI at the time. After the acceptance of the proposal by the Scientific Union, the International Council of Scientific Unions formed a small special committee of seven members. Three members of the Committee, Lloyd Berkner, Jean Coulomb, and Marcel Nicolet met in Brussels on October 15, 1952, and wrote to the Academies of Sciences and similar bodies inviting them to form their own national committees which would be responsible for the local organization of an International Geophysical Year. In the end, the Special Committee for the IGY was created with Sydney Chapman and Lloyd Berkner as president and vice-president, respectively; Jean Coulomb and Vladimir Illiushin were members of the Bureau and consequently Marcel Nicolet the secretary general. As a result, I became totally interested in the organization of the IGY over an interval of 7 years which I have always regarded as the characterful period of my scientific career. My responsibilities were to encourage participation in the IGY on a worldwide scale, even though the Korean War has been in progress since June 1950, and which only be halted by an armistice in July 1953.

It was necessary also to ensure the collaboration of the leading scientists and specialists in the various disciplines. My contacts with the scientific communities were made through the dozen or more discipline reporters; these were eminent scientists who had the task of planning the detailed aspects of the program in their respective fields. In spite of the enthusiasm associated with the international cooperation of scientists from 63 countries, it was not always possible to avoid difficulties and obstacles. Problems relating to the organizational structure engendered differences of opinion, for I had always advocated the avoidance of rigid administrative arrangements and the need to concentrate rather on the effective management of the scientific program. In general, the risks to be avoided and the problems encountered had political undertones. To quote one example, the question of the participation of the People's Republic of China occupied the attention of Chapman and myself for several years, and severely restricted the time available for dealing with scientific matters. Although this problem may now seem unimportant for young scientists, its political aspects 25–30 years ago took up a considerable portion of the 10,000 hours or so that I devoted to the IGY. Perhaps this is why I have always felt somewhat disassociated with my activities as secretary general of the IGY Committee. In fact, I often regret the energy dissipated without the least advantage to science and the damage done on some occasions to the relations between individuals working for a common cause. However, in spite of everything I

like to recall that, in the end, the IGY allowed me to make friends the world over; in all the continents and in all the countries that participated in the enterprise. If I still retain a certain feeling of bitterness about having devoted too much time to the organization of the IGY, especially during the years of my life when I should have been more active scientifically, this feeling has been wiped out by the distinction conferred on me by the American Geophysical Union through the award of the William Bowie Medal. Since the word "unselfish" in the citation is intended "in mean willingness on the part of the recipient to step out of his organized field of competence and work with men in other sciences to expand more or less upon their knowledge, to sacrifice time and energy in meetings, and to correspond with fellow scientists, although this may not bring tangible rewards in the form of papers from his own pen" (Eos, p. 315, 1967), then I welcome this interpretation not only with great pleasure, something I often feel, but also with great satisfaction: a sentiment which is exceptional for me.

However, it would not be appropriate for me to end these reminiscences on a too personal a note. The legacy of the IGY has taken many different forms, and this international scientific enterprise became the origin of extraordinary developments in geophysics, such as can be seen in the AGU, for example. The present text has been written partly in my study at home, and partly in my two offices in the Royal Meteorological Institute and in the Institute for Space Aeronomy (a post-IGY creation). All three locations lie within a radius of 1 mile and, inside the circle, I am aware of the international group, created originally for the IGY, which have since become permanent national institutions.

Before concluding, may I refer to another very recent legacy of the IGY, namely, the idea of an international decade which is to be devoted to the coordinated study of all aspects of both the geosphere and the biosphere. In my opinion, it will be of the greatest importance to ensure that the data acquired during this new enterprise shall be as accurate and as reliable as possible. The accumulation of large volumes of observational data must not tempt research workers to publish statistical results that contain hidden systematic errors. At the present time, although there is an abundance of observational data relating to space research, there is also evidence for changes in the sensitivity of some sensors. In consequence, unfortunately, it is often far from easy to draw reliable conclusions from the measurements available. It is my firm opinion that, in a mature branch of science such as geophysics, the need for cross calibrations might be accepted as a basic requirement designed to ensure that the theoretician and the observer can at least become close allies.

With this word of advice from an old friend, I must conclude; but let me express my profound gratitude to the members of the American Geophysical Union, to Julian Heicklen, Eugene Shoemaker, and the members of the William Bowie Award Committee, and to James Van Allen and all the other council members.

Marcel Nicolet

Meetings



Call for Papers

Abstracts must be received at AGU by 5 P.M., September 12, 1984. Late abstracts (1) may be summarily rejected in program chairman, (2) may not be published in advance of the meeting, and (3), if accepted, will be charged a \$25 late fee, in addition to the regular publication charge.

The 1984 Fall Meeting of the American Geophysical Union will be held in San Francisco, December 3–7, at the Civic Auditorium. Blocks of sleeping rooms are being held at the Cathedral Hill, Holiday Inn-Golden Gate, Hyatt Inn-Civic Center, the San Francisco Hotels and at several Best Western motels. Corresponding authors will be sent housing and registration forms. In addition, these forms will be published in *Eos*.

General Regulations

• Abstracts may be rejected without consideration of content if they are not received by the deadline date or are not in the proper format. Abstracts also may be rejected if they contain material outside the scope of AGU activities if the material has been published previously or presented elsewhere. Only one contributed paper by the same first author will be considered for presentation; additional papers (unless invited) will be rejected automatically.

• Only AGU and ASLO members may submit an abstract. The abstract of a nonmember must be accompanied by a membership application form (with payment) or it must be sponsored by an AGU member.

• There is a publication charge of \$40 (\$30 if prepaid) for each abstract. The publication charge is \$20 when the first author is a student. Both invited and contributed papers are subject to the publication charge. Preparation of the publication charge can save money. Send a check for \$80 (\$15 for students) with your abstract. The abstract must be received at AGU by September 12 to avoid an additional \$20 charge. Abstracts not prepaid will be invited prior to the meeting. Payments will be accepted at the meeting.

• AGU will acknowledge receipt of all abstracts. Notification of acceptance and scheduling information will be mailed to corresponding authors in late October.

Abstracts

The abstract page is divided into two parts: the abstract itself and the submitted information. Follow the instructions for both carefully. Copy must be of letter quality type. Do not exceed the maximum dimensions specified for the type of presentation you are requesting (11.8 cm x 18 cm for oral or title; 11.8 cm x 28 cm for a poster). Abstracts which exceed the maximum dimensions specified for the type of presentation requested will be trimmed to conform. The chairman may assign you to one of these types of presentation in order to fit the program plan. Program Chairmen may have absolute authority to schedule papers for the type of presentation which fits their program. If you wish to withdraw your paper rather than present it in a form other than specified, so indicate.

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Poster Sessions

Experience from AGU meetings and from other scientific societies has shown that a poster presentation, while under demanding of the author, can provide a superb opportunity for comprehensive discussions of research results. Some sections are organizing poster sessions on specific topics, and routinely papers on these subjects will automatically be scheduled as posters. In other sections it may be necessary to assign papers to poster sessions even though their authors request oral presentation.

Presenters of poster papers are reminded that a poster exhibit requires careful preparation. Figures and text should be scrutinized in detail, and authors must be prepared to discuss the contents of their papers in depth. Under these conditions, well-prepared figures and concise, logical text are essential.

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